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13. ABSTRACT (Maximum 200 words)

In the past year, the University of Maryland has monitored and arranged for the convening of 10 Research Evaluation Groups or Panels to review and evaluate various aspects of the Physical Sciences Program, AFOSR, ranging over such diverse disciplines as high power microwave technology, electromagnetic radiation, laser physics, seismic detection, photo acoustics, infrasonics, thin films, flight dynamics, environmental toxicology, and biomedical sciences. These reviews and evaluations involved approximately 539 person-days of effort by independent scientists selected from Universities and Industry for their expert knowledge and experience in the requisite fields. Since the University of Maryland undertook the review and evaluation of the AFOSR Physical Sciences Program in July 1965, a total of approximately 108 panel meetings have been held for this purpose, and a total of approximately 1,569 person-days of conferring on and analysis of the strength and relevance of OSR's programs have been accomplished.

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Final Scientific Report

on the

Review and Evaluation of Physical Sciences Program, AFOSR

Contract F49620-81-C-0060

Principal Investigator: Alex J. Dragt

May 1982

UNIVERSITY OF MARYLAND
Department of Physics and Astronomy
College Park, Maryland

A. Work Proformed

Over the past several years the University of Maryland has provided AFOSR Physics Directorate with specialized research evaluation pertinent to the different disciplines of the physical sciences including physics, space physics, atmospheric physics, terrestrial sciences, and chemistry. This evaluation has been accomplished through the monitoring of Research Evaluation Groups and Panels for the Directorate of Physics, and the monitoring of the review of unsolicited proposals for research to be sponsored by AFOSR. The purpose of this effort has been to assist the Directorate in the evaluation of current research programs, and the planning of new programs in order to assure continued excellence.

In the past year, the University of Maryland has monitored and arranged for the convening of 10 Research Evaluation Groups or Panels to review and evaluate various aspects of the Physical Sciences Program, AFOSR, ranging over such diverse disciplines as high power microwave technology, electromagnetic radiation, laser physics, seismic detection, photo acoustics, infrasonics, thin films, flight dynamics, environmental toxicology, and biomedical sciences. These reviews and evaluations involved approximately 539 person-days of effort by independent scientists selected from Universities and Industry for their expert knowledge and experience in the requisite fields. Since the University of Maryland undertook the review and evaluation of the AFOSR Physical Sciences Program in July 1965, a total of approximately 108 panel meetings have been held for this purpose,and a total of approximately 1,569 person-days of conferring on and analysis of the strength and relevance of OSR's programs have been accomplished.

In addition, during the past year the review of approximately 40 unsolicited proposals for sponsored research has also been accomplished. This makes a total of approximately 295 proposal reviews since July 1965. As in previous years, these reviews have been obtained from scientists throughout the country who are selected because of their expertise and special knowledge in the research fields covered by the proposals. Their critical review and appraisal has played a vital part in OSR's consideration of sponsorship of research.

The University of Maryland's Department of Physics and Astronomy considers it particularly appropriate that the review and evaluation of AFOSR's

general physical sciences programs and the review of proposals for sponsored research be performed by distinguished members of the Nation's total science community. Such a procedure insures continued excellence and an optimum use of the Nation's financial and intellectual resources.

B. Suggested Areas for Future Support

The present unsolicited proposal and review process employed by the Air Force Office of Scientific Research is well designed to support important areas of existing research and to foster the development of new ideas and concepts. It has functioned well in the past, and should continue to function well in the future. In addition, the various Air Force and other Government Laboratories are also effective in carrying out research and generating new concepts.

Based upon a reading of scientific review literature over the past year, including Science News, Science, and Physics Today, and upon personal contacts with various members of the scientific community, there appear to be some new and particularly promising developments which may be worthy of further investigation. These areas are listed below. Of course this list is only partial and not well researched; and the areas suggested should be subject to the usual review process.

1. There appear to be developments in solid state optical devices which could lead to the development of computers which are based upon the manipulation and control of light pulses. These computers may be more compact, more rugged, faster, cheaper and require less power than present computers based upon the use of electrical impulses and semiconductor technology

2. Recent work on free electron lasers suggests that it may be possible to produce lasers which are both tunable, and very efficient using the methods of accelerator technology. As well as having possible defense applications, these lasers could be of great benefit to the chemical industry for refining processes and the driving and catalysis of various reaction processes.